REMARKS

By the above actions, claim 1 has been amended and claims 1-4 continue to be pending. In view of these actions and the following remarks, reconsideration of this application is requested.

Claims 1-2 were rejected, under 35 U.S.C. § 103(a), as being obvious in view of the teachings of the Wei et al. ('714) patent; while claims 3 and 4 were rejected, under 35 U.S.C. § 103(a), as being obvious in view of the teachings of the Wei et al ('714) patent combined with the teachings of the Nagayama ('123) patent. However, each of these rejections is inappropriate as will become apparent from the discussion of each reference..

A review of the Wei et al reveals that the reference teaches controlling the coefficient of thermal expansion gradient in a lamp seal in order to prevent cracking during operation of the lamp, but does not teach or suggest controlling the coefficient of thermal expansion gradient of the seal material, at the point of attachment of the lead bar, in order to prevent cracks in the seal material at the point of attachment during manufacture as presently disclosed and claimed. Particularly, Wei et al teach that the point of attachment (which is always the outermost cermet layer) must have a composition that allows for welding of the cermet while also matching the coefficient of thermal expansion of the outermost cermet and the lead bar. The patentees specifically note (column 7, lines 6-11) that:

> The important feature is that the outermost cermet layer or part of the plug has a composition that enables it to be welded. To fulfill the requirement a proportion of metal more than 50 vol.-% is requested for the outermost layer. This layer can be, but does not necessarily have to be electrically conducting. (emphasis added)

Therefore, at the point of attachment, the cermet contains at least 40 vol % tungsten (column 9, lines 10-2)5, and preferably more than 50 vol.% since tungsten has a substantially lower coefficient of thermal expansion than molybdenum which provides

a "special trick" that enables the outermost cermet layer (Figure 2, element 11g) to have a coefficient of thermal expansion matched with that of the molybdenum lead (Figure 2, element 7b) thereby preventing cracking during operation of the lamp (column 9, lines 26-46) while permitting welding. The general relationship of matching the thermal coefficient of expansion of the outermost cermet layer by introducing a sufficient tungsten (or molybdenum) into the non-conductive cermet is maintained throughout each examples of Wei et al, such that in some embodiments the amount of tungsten can be as high as 70 vol % or the amount of molybdenum can be as high as 65 vol %. (Figures 5, 6, 7, 8a, 8b; column 9, line 56, to column 10, line 62; column 11, line 1, to column 12, line 25). Clearly, a teaching of adding progressively higher than 40 vol% tungsten into the outermost cermet layer to permitting thermal coefficient matching and welding is in direct contrast to the presently claimed invention which recites that the lead bar is tungsten (with its lower thermal coefficient of expansion relative to molybdenum), the non-conductive material is silica and the conductive material is molybdenum (with its higher thermal coefficient of expansion relative to tungsten). Wei et al contains absolutely no suggestion or motivation to modify (invert) its teachings to add a compound having a higher thermal coefficient of expansion, i.e., molybdenum, relative to a lead bar, i.e., tungsten, to an outermost cermet layer at less than 40 vol% since to do so would not enable thermal coefficient matching while permitting welding of the outermost cermet layer to the lead bar.

Further, Wei et al do not suggest that the thickness of the cermet approaching the point of attachment should be varied with regard to the relative amount of conductive material in the cermet as claimed in claim 3, i.e., the relative thickness of the cermet where the lead bar is not attached is varied relative to the thickness of the the cermet at the point of attachment to the lead bar. That is the thickness of the functionally gradient material does not vary as claimed (Figure 5, elements 25a, 25f; column 10, lines 54-57; Figure 12, elements 46a-46e; column 14, lines 58-67)

A review of the Nagayama reference, cited to allegedly teach the progressively tapered hole extending toward the non-conductive end with progressively thicker cermet layer towards the point of attachment (Figure 16, elements 303, 310) of claims 3 and 4, does not remedy either of the deficiencies of Wei et al. noted above. Specifically, Nagayama teaches (Tables 2-7) that the satisfactory amount of tungsten in the region of attachment to the lead bar to permit adequate service life is always above 50 vol%, and preferably as high as 90 vol % (Table 7) in the stack cermet layer arrangement (Figure 16) similar to that of Wei et al. Even more importantly, Nagayama teaches that tungsten in the amount as low as 35 vol % in the outermost cermet layer (Tables 5, 6; comparative examples 5) is unsatisfactory for providing adequate service life. Finally, Nagayama teaches that the thickness of the functionally gradient material from the point of attachment (Figure 16, element 303_{n-1}) to non-conductive end (Figure 16, element 303_1) is greater than the thickness of the functionally gradient material at the point of attachment to the lead bar (Figure 16, element 303_n).

As a result, since neither Wei et al or Nagayama teach or render obvious these two key aspects of the presently claimed invention. Therefore, the rejections of the claims 1-4, under § 103(a), based upon Wei et al, alone or in combination with Nagayama, are fatally defective and must be withdrawn. Such action now being requested.

The prior art which has been cited but not applied by the Examiner has been taken into consideration during formulation of this response. However, since this art is not any more relevant than that relied upon by the Examiner and was not considered by him to be of sufficient relevance to applied against the original claims, no detailed discussion thereof is believed warranted at this time.

While the present application is now believed to be in condition for allowance, should the Examiner find some issue to remain unresolved, or should any new issues arise, which could be eliminated through discussions with Applicants' representative,

then the Examiner is invited to contact the undersigned by telephone in order that the further prosecution of this application can thereby be expedited.

Lastly, it is noted that a separate Extension of Time Petition (three months) accompanies this response along with a check in payment of the requisite extension of time fee. However, should that petition become separated from this Amendment, then this Amendment should be construed as containing such a petition. Likewise, any overage or shortage in the required payment should be applied to Deposit Account No. 19-2380 (740145-148).

Respectfully submitted,

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